PROGRESS

OF

MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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On the Production of Specific Cytolytic Sera for Thyroid and Parathyroid, with Observations on the Physiology and Pathology of the Parathyroid Gland, especially in its Relation to Exophthalmic Goitre.— In 1902 GONTSCHARUKOV claimed that he had been able to produce a specific antithyroid toxin by the injection, at intervals of four weeks, of an emulsion of dog's thyroids into the subcutaneous tissue of a sheep. By the injection of the blood serum of this sheep, which died during the experiment, into the circulation of other dogs certain tetanic symptoms resulted which he thought indicated the existence of a specific antithyroid toxin.

W. G. MACCALLUM (*Medical News*, October 31, 1903, p. 820) conducted a series of experiments to control these results. He points out first that the destruction of the thyroid alone produces disturbances of metabolism, which appear slowly and are characterized by the symptoms known as myxœdema. Destruction of the parathyroid alone, on the other hand, produces the acute rapidly fatal nervous phenomena which have so long been thought to be due to the extirpation of the thyroid. These phenomena are tetany and polypnœa. Until recent years the early fatal results following thyroidectomy had been attributed to the extirpation of the thyroid, while in reality they were due to removal of the parathyroid glands, which are small and inconspicuous and usually embedded in the tissue of the thyroid.

In his investigation MacCallum made repeated injections of an emulsion of dog's parathyroids into the peritoneal cavities of geese. At intervals the centrifugalized serum from the defibrinated blood of these geese was injected into the peritoneal cavity of dogs. The symptoms produced in these dogs were not at all striking. Emaciation and a cachexia developed in a number of them. These symptoms, however, occurred also in dogs injected with normal geese serum. In one case convulsive twitching of the muscles resulted without dyspnœa. After the injections a large number of the dogs were killed at varying intervals and their thyroids examined histologically. In none of the cases could a microscopic change be made out. The writer therefore concludes that the attempt to produce a cytotoxin capable of destroying the cells of the thyroid glands *in situ* has not been successful. He believes, however, that a material was probably produced in the blood of the geese capable of combining with the normal secretion of the dog's thyroid or parathyroid and neutralizing it, thus allowing the symptoms which ordinarily follow extirpation of these glands to occasionally appear in a mild degree. MacCallum thinks that his experiments throw considerable doubt on Gontscharukov's results, at least on the interpretation of them, for one would not expect tetanic contractions as an effect of the destruction of the thyroid by a specific serum.

The writer was led by the above work to carry on some investigations with the view of determining the rôle of the parathyroid glands under normal conditions and in disease. Dogs were used in the experiments. The parathyroids were removed in a number of animals. The symptoms of the parathyroidectomized animals were briefly as follows: After symptoms of unrest, with slight twitchings of the muscles, the animal rapidly develops violent tetanic spasms. It experiences difficulty in walking and periodically falls to the floor in an epileptiform convulsion. There is marked trismus, and the eyes appear to project owing to retraction of the upper lid. The respirations are greatly increased, even up to 200 to 250 per minute, but there is no cyanosis. There was no specially increased heart action. The animal may die at the height of the attack, or the convulsions may gradually become less violent, death resulting from exhaustion.

Three problems present themselves: (1) Are these symptoms due to absence of some necessary secretion of the parathyroid? (2) Are they due to some poison produced somewhere in the body and circulating in the blood, but which, in the normal animal, would be neutralized by the parathyroid cells themselves or by their secretions? (3) Is this poison absorbed from the intestine; is it the result of metabolism of certain groups of cells, or is it the product of muscle or nerve metabolism? As a result of some ingenious experiments the writer concludes that while it seems improbable that the parathyroids secrete a necessary material which is circulated in the blood, the lack of which produces the disturbances described, it does seem probable that they produce a material which neutralizes poisons produced elsewhere, poisons which if not so neutralized may be mechanically washed out with the relief of the symptoms.

The parathyroids were shown to have no influence on nitrogen metabolism, whereas it was demonstrated that the nitrogen output was markedly affected by removal of the thyroids.

There is no very convincing evidence advanced by the writer to show that the parathyroids are in any very close way associated with the etiology of exophthalmic goitre. Parathyroidectomy is followed by muscle spasms, and muscle tremor is a symptom of exophthalmic goitre. Occasionally there is slight prominence of the eyes following the operation. Further than this there is no particular resemblance. It is worthy of note, however, that an examination of the parathyroids embedded in the excised thyroid glands of exophthalmic goitre patients all showed atrophy, and in two instances the glands showed very distinct degenerative changes in the parenchyma cells with overgrowth of connective tissue.

The Thick-film Process for the Detection of Organisms in the Blood.—RONALD ROSS (*Thompson Yates and Johnston Laboratories Report,* 1903, vol. v., part I., p. 117) uses a very large drop of blood in this method, and does not attempt to spread the blood out in a thin layer on the cover-glass. No attempt at fixing the hæmoglobin is made. The thick film of blood on the slide is merely dried, and then very gently washed with water until all color has disappeared. For staining purposes only aqueous solutions of the stains are used. Ross now uses the following stock formulæ for staining: (1) Eosin, 1 gram; water, 1000 c.c. (2) Medicinal methylene blue, 10 grams; sodium carbonate, 5 grams; water, 1000 c.c. After washing out the hæmoglobin as described above, a drop or two of the eosine solution is now placed upon the cover-glass without previous drying, and allowed to remain for one minute. Then a drop or two of the methylene blue solution is run on and allowed to remain for fifteen to thirty seconds. Finally the cover-slip is washed very gently with a stream of water for a minute or two, dried and mounted for examination.

Ross uses this method for detecting the presence of malarial organisms where they are very few, and also for trypanosoma. In one case of malaria where only one parasite could be found in a field by the old method, by the new one as many as eighty could be found. The malarial parasites stain blue and the nuclear chromatin a distinct red. The red cells are unstained, owing to their hæmoglobin being washed out. Bell and Laing advocate the use of this method for the detection of plague bacilli in the blood.

The Tendo-Achilles Jerk and Other Reflexes in Diabetes Mellitus—WILLIAMSON (*Review of Neurology and Psychology,* October, 1903, p. 667) states that in diabetic mellitus, as in locomotor ataxia, the tendo-Achilles jerks may disappear before the knee-jerks are lost. His results in the examination of these reflexes in 50 diabetics was as follows: (1) In 19 both Achilles-jerks were absent. In these cases both knee-jerks were present in 8; one present and one absent in 3; both absent in 8. (2) In 2 cases one Achilles-jerk was absent and one present. In these cases both knee-jerks were present. (3) In 29 cases both Achilles-jerks were present. In this series both knee-jerks were present in 28, and one knee-jerk present and one absent in one.

The writer points out that the knee-jerks are much more likely to be absent in hospital than in private cases, in which the conditions of life are better. Thus, in the former he found both knee-jerks absent in 49 per cent. of the cases, while in the latter both were absent in only 12 per cent. He finds that the wrist-jerks are usually absent where the knee-jerks are absent. The causes for the disappearance of the deep reflexes are not discussed. The superficial reflexes—plantar, abdominal and epigastric—are present in practically all cases. It is stated that in the severest cases the abdominal and epigastric reflexes are usually much increased. The plantar reflex is of the normal type.